Message

From: Dan Johnson [DanJohnson@florencecopper.com]
Sent: 11/7/2018 7:04:02 PM
To: Rumrill, Nancy [Rumrill.Nancy@epa.gov]
CC: Albright, David [Albright.David@epa.gov]
Subject: Low-Flow Sampling Information for M57-O
Attachments: ATT00001.txt; FCI_Sampling_Procedure.pdf; M57-O_Revised_Diagram_20181107.pdf; Supplemental_Well_WQ_Table.pdf

Good Morning Nancy,

Attached is the documented and regulatory-approved sampling procedure submitted to the regulatory agencies in August 2012. To date, this procedure has been followed in several quarterly sampling efforts since 2012. Below is a brief summary for low flow sampling at Florence Copper:

Low flow pumps are dedicated to each monitor well. They are not moved between wells.

The basic procedure is:

- Calibrate field parameter meter
- Collect static water level
- Start the micro purge pump
- Collect pumping water levels and confirm drawdown less than 0.5 feet
- Purge equipment and tubing
- Collect field parameters until stable
- Fill sample bottles

Based on several years of experience, our consultant (Brown & Caldwell) has determined what flow rate is appropriate for each well. The flow rate is set to minimize drawdown, and thereby minimize mixing in the well.

For example, the low-flow pump in M57-O is set at 950 feet below land surface (see revised well diagram and Well Wizard Specification sheet illustrating the depth of the low-flow pump). The purge volume of the equipment is 8.7 liters. The flow rate is typically approximately a liter every three minutes (330 ml/min). The drawdown (pumping vs static) has been approximately 0.02 feet. It has taken approximately 15 to 17 liters to reach stable field parameters before the sample is collected. The volume of water column from the pump up to the oxide lower basin unit (LBFU) contact is approximately 385 gallons (1270 liters). Therefore, it would take a significant pumping effort to dewater the well column and draw LBFU water to the intake of the low flow pump.

M57-O has been sampled at least 8 times for the calculation of alert levels. The water quality indicates that the water collected is from the Oxide zone. Please review the attached tables in which I have highlighted some of the most compelling indicator parameters. As mentioned yesterday during our discussion is Nitrate. Nitrate from agriculture is at or above drinking water standards of 10 ppm in the upper units and declines with depth. M57-O shows an average of 1.1, a minimum of 0.55 and a maximum of 1.6 ppm in the 8 ambient samples. When compared to the other sampled supplemental oxide wells, the indicators parameters are quite comparable to one another and definitely different from the water quality in the supplemental Upper and LBFU wells.

Please contact me if you need any further information on the low flow sampling procedure at M57-O.

Best Regards,

Dan Johnson VP | General Manager

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